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U.S. Department of the Interior • U.S. Geological Survey

# MINERAL INDUSTRY SURVEYS

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Nickel, Monthly

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## NICKEL IN MAY 1996

Reported domestic nickel consumption in May, on a daily average basis, was slightly greater than that of April, according to the U.S. Geological Survey. Daily usage by the stainless steel industry was up about 8% from the April figure of 101 metric tons (t). Average daily sales to plating companies also increased, rising almost 15% to 43 t. However, consumption of elemental nickel to make superalloys and nickel-base corrosion resistant alloys declined slightly. The percentages reported in this paragraph may not be verifiable due to the concealment of company proprietary data. Trade data for May 1996 will appear in a subsequent issue.

### Falconbridge Turns Toward South Africa

Falconbridge Ltd. has teamed up with Gencor Ltd. to explore for nickel and copper in South Africa. A third company (Randgold & Exploration Co. Ltd.) also will participate in the exploration venture. Initial efforts reportedly will focus on the Mount Ayliff region of Eastern Cape Province. (See *Mining Journal* (London), v. 326, no. 8382, June 14, 1996, p. 458.)

Falconbridge has applied to the South African Dept. of Mineral and Energy Affairs (DMEA) for a license to explore for massive sulfides on some 140 km<sup>2</sup> near Kokstad, between Lesotho and the Indian Ocean. The other two partners in the venture already have licenses covering 430 km<sup>2</sup> of the region. If Falconbridge's application is approved, the joint venture will be free to search the combined area of 570 km<sup>2</sup>.

Sporadic, disseminated nickel-copper sulfide mineralization exists at several localities along the base of the Mount Ayliff Intrusion, composed dominantly of magnesian and iron silicates, south and southwest of Kokstad. The intrusion is believed to be the dissected remnant of a single sheet of differentiated gabbros, created about 200 million years ago by the injection of basaltic magma into sedimentary strata of the Karoo Sequence. The Mount Ayliff Intrusion, referred to as the Insizwa Complex in pre-1990 publications, covers more than 1,000 km<sup>2</sup> and is 600 to 700 meters thick in places.

During the second half of the 19th century, pyrrhotite-pentlandite-chalcopyrite mineralization was found at Waterfall Gorge and several adjoining sites in the Insizwa lobe of the intrusion. The richest mineralization in the Waterfall Gorge area occurs at or within a few meters of the basal contact of the eroded, sill-like sheet. Some limited underground development work was done at these sites between 1908 and 1915, but the mineralization was too spotty to justify sustained mining. The sulfides tend to be widely disseminated throughout the 20-meter-thick basal layer of olivine-rich gabbro and only occasionally form small, localized lenses or stringers. Exploration efforts since World War II have still not identified sufficient tonnages of ore that would justify large-scale mining.

The basal gabbro is immediately overlain by a rock unit composed of more than 60% olivine and about 5% chromite, the rest being plagioclase and pyroxene. This second layer is more than 300 meters thick in some places. Olivine from both layers typically assays 1,200 to 1,900 parts-per-million nickel. Olivine

is much less abundant in the upper levels of the intrusive and, when present, contains considerably less nickel.

Some of the first investigators hypothesized that the bulk of the sulfides segregated prior to injection at depths too deep to mine. However, the relatively high nickel content of the basal olivine and other recent geochemical evidence now suggest that at least part of the sulfides did not segregate from the main magma until after the magma was injected into the country rock, and that these sulfides may lie somewhere within the confines of the intrusion. (See Cawthorn, R. G., *et al.*, *Nickel Sulphide Potential of the Mount Ayliff Intrusion (Insizwa Complex)*, *Transkei, S. Afr. Jour. Sci.*, v. 82, no. 10, 1986, p. 572-576.)

Gencor has become increasingly involved with nickel in recent years and is currently considering building a smelter in Indonesia. The South African-based company holds a 45% interest in Samancor Ltd., one of three partners in the Columbus Stainless Steel Project. Gencor also has a 52% stake in Cerro Matoso S.A.—the Colombian ferronickel producer—as well as a 46% share in Impala Platinum Holdings Ltd. (IMPLATS). IMPLATS

is now in the process of merging its platinum and byproduct nickel operations with those of Lonrho South Africa Ltd.

Randgold, the other partner in the Mount Ayliff project, manages 10 gold mining and recovery operations within South Africa. Randgold's exploration subsidiary, Randgold Resources, has active gold exploration programs in Gabon, Tanzania, and four West African countries.

Falconbridge is no stranger to the African continent and has been exploring for nickel in Botswana, Côte d'Ivoire, and Zimbabwe. The company has had considerable success in Côte d'Ivoire, where it has been evaluating several nickel-cobalt laterites as part of a joint venture with Trillion Resources Ltd. of Canada and the Côte d'Ivoire Government. The Falconbridge-Trillion team has identified significant resources at three locations: (1) Fongouesso/Moyango, (2) Viala/Yamatoulo/Touba, and (3) Sipilou North. Between 1995 and 1996, Falconbridge increased its overall exploration budget from \$39 million to \$50 million, an increase of 28%.

TABLE 1  
CONSUMPTION OF NICKEL (EXCLUSIVE OF SCRAP), BY FORM AND USE 1/

(Metric tons, nickel content)

Period	Cathodes, pellets, briquets, and powder	Ferronickel	Oxide-sinter, salts, and other forms	Total	Total year to date
1995:					
May	7,340	870	777	8,990	43,800
June	7,170	1,320	300	8,790	52,600
July	6,370	1,340	157	7,870	60,500
August	7,100	1,720	225	9,040	69,500
September	7,720	2,460	309	10,500	80,000
October	6,590	1,840	337	8,770	88,700
November	5,830	1,690	630	8,150	96,900
December	6,250	1,860	244	8,360	105,000
January-December	82,900	17,400	4,950	105,000	XX
1996:					
January	6,930	1,500	307	8,740	8,740
February	6,960 r/	1,230	268 r/	8,460 r/	17,200 r/
March	6,730	1,480	318	8,530	25,700 r/
April	6,580	1,490	249 r/	8,320 r/	34,000
May:					
Steel:					
Stainless and heat resisting	2,030	1,360	W	3,390	15,800
Alloy (excludes stainless)	466	W	W	466	3,240
Superalloys	1,170	--	W	1,170	5,490
Copper-nickel alloys	W	W	--	W	W
Electrical, magnetic, and expansion alloys	W	--	--	W	W
Other nickel & nickel alloys	1,450	W	W	1,450	7,780
Cast iron	W	--	W	W	W
Electroplating (sales to platers)	1,330	--	W	1,330	6,000
Chemical and chemical uses	W	--	W	W	W
Other uses	568	114	252	934	4,470
Total reported	7,010 2/	1,470	252	8,740	42,800
Total all companies (calc) 3/	XX	XX	XX	12,700	62,300
1996: January-May	34,200	7,180	1,400	42,800	XX
1995: January-May	35,900	5,150	2,750	43,800	XX

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Other uses" category.

XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Of consumption, 5,760 metric tons were consumed as cathodes and pellets, the remainder as briquets and powder.

3/ Figures represent calculated apparent consumption; based on the revised proportion of reported primary consumption (68.69%) to apparent primary consumption for 1994.

TABLE 2  
ENDING STOCKS OF NICKEL (EXCLUSIVE OF SCRAP) HELD BY CONSUMERS,  
BY FORM AND USE 1/ 2/

(Metric tons, nickel content)

Period	Cathodes, pellets, briquets, and powder	Ferronickel	Oxide-sinter, salts, and other forms	Total
1995:				
May	5,310	201	198	5,710
June	4,420	240	157	4,820
July	5,240 r/	213	157	5,610 r/
August	5,000	372	161	5,530 r/
September	4,300	324	123 r/	4,750 r/
October	4,900	429	115 r/	5,450 r/
November	5,630	362	115 r/	6,110 r/
December	5,190	635	204	6,030
1996:				
January	4,690	329	106	5,120
February	5,040 r/	292	95 r/	5,420
March	4,600 r/	207	69	4,870 r/
April	4,400	131 r/	81 r/	4,610 r/
May:				
Steel (stainless, heat resisting and alloy)	1,860	(3/)	(3/)	1,860
Nonferrous alloys 4/	2,030	(3/)	(3/)	2,030
Foundry (cast irons)	2	--	(3/)	2
Chemical (catalysts, ceramics, plating salts, etc.) and unspecified uses	138	342	92	572
Total	4,030	342	92	4,470

r/ Revised.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Stocks held by companies that consume nickel in more than one end use category are credited to the major category. Stocks are subject to revision owing to inventory adjustment.

3/ Included in "Chemicals and unspecified uses" category.

4/ Includes super, nickel-copper and copper-nickel, permanent magnet, and other nickel alloys.

TABLE 3  
CONSUMPTION AND ENDING STOCKS OF PURCHASED SECONDARY NICKEL, BY USE 1/

(Metric tons, nickel content)

Period	Consumption			Stocks		
	Ferrous scrap 2/	Nonferrous scrap 3/	Total scrap	Ferrous scrap 2/	Nonferrous scrap 3/	Total scrap
1995:						
May	4,680 r/	859	5,530 r/	2,730 r/	122	2,850 r/
June	4,680 r/	800	5,480 r/	2,400 r/	96	2,500 r/
July	3,820 r/	550	4,370 r/	2,600 r/	106	2,700 r/
August	3,190 r/	858	4,050 r/	3,400 r/	109	3,500 r/
September	4,140 r/	729	4,870 r/	3,200 r/	96	3,300 r/
October	3,030 r/	650	3,680 r/	3,490 r/	103	3,600 r/
November	4,300 r/	901	5,200 r/	3,240 r/	109	3,350 r/
December	3,970 r/	644	4,620 r/	3,500 r/	104	3,600 r/
January-December	48,900	9,200	58,100	XX	XX	XX
1996:						
January	3,430	706	4,140	3,710	127	3,840
February	3,380	1,060	4,450	4,200	121	4,320
March	4,680	912	5,590	3,980	93	4,080
April	3,900 r/	757	4,660	3,750 r/	90 r/	3,840 r/
May	4,140	737	4,880	3,120	98	3,220
January-May	19,500	4,180	23,700	XX	XX	XX

r/ Revised. XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Nickel content is calculated from an average nickel content and the reported gross weight of scrap.

3/ Combined consumption and stocks of aluminum-base, copper-base, and nickel-base scrap.

TABLE 4  
U.S. IMPORTS FOR CONSUMPTION OF NICKEL, BY COUNTRY 1/

(Metric tons, nickel content 2/)

Period and country of origin	Cathodes, pellets, and briquets	Powder and flakes	Ferro- nickel	Metal- lurgical- grade oxide	Waste and scrap	Stainless steel scrap	Chemicals	Total 3/	Total year to date 4/	Wrought nickel
1995:										
April	8,980	1,340	1,120	66	691	221	438	12,900	56,900	71
May	7,250	958	1,330	42	400	260	293	10,500	67,400	35
June	12,500	1,040	1,270	35	450	345	261	15,900	83,300	1,670
July	6,400	273	1,570	51	270	269	348	9,180	92,500	118
August	10,400	628	1,500	23	303	290	328	13,500	106,000	44
September	9,060	767	1,880	71	332	271	518	12,900	119,000	33
October	11,200	859	1,470	32	342	211	302	14,400	133,000	33
November	9,200	820	1,440	35	387	261	346	12,500	146,000	34
December	8,930	563	830	25	308	239	210	11,100	157,000	77
January-December	118,000	9,510	16,700	530	4,740	3,190	4,210	157,000	XX	2,310
1996:										
January	11,000	1,030	887	46	333	313	377	14,000	14,000	51
February	9,970	709	1,540	14	309	312	419	13,300	27,200	55
March	9,130	917	2,130	39	385	369	241	13,200	40,400	60
April:										
Australia	210	13	--	--	--	--	--	223	5,220	--
Brazil	18	--	--	--	--	--	--	18	246	--
Canada	4,810	555	--	21	96	159	41	5,680	20,400	1
Colombia	--	--	263	--	--	--	--	263	406	--
Dominican Republic	--	--	492	--	10	--	--	502	3,030	--
Finland	216	--	--	--	--	--	31	247	1,040	--
France	143	--	--	--	38	--	14	195	671	(5/)
Germany	--	27	--	--	10	3	18	58	226	47
Japan	(5/)	--	--	--	11	14	9	34	389	2
New Caledonia	--	--	190	--	--	--	--	190	1,720	--
Norway	1,990	--	--	--	6	--	--	1,990	8,590	--
Russia	3,520	154	--	--	8	--	--	3,680	8,660	--
South Africa	223	--	--	--	--	--	--	223	413	--
United Kingdom	19	7	--	--	33	--	5	64	419	1
Zimbabwe	160	--	--	--	--	--	--	160	728	--
Other	--	3	36	--	132	138	69	378	2,150	(5/)
Total	11,300	760	980	21	344	313	187	13,900	54,300	52
1996: January-April	41,400	3,410	5,530	119	1,370	1,310	1,220	54,300	XX	218
1995: January-April	43,000	3,600	5,450	217	1,950	1,040	1,600	56,800	XX	269

XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ The nickel contents are assumed to be as follows: metallurgical-grade oxide (77%), waste and scrap (50%), and stainless steel scrap (7.5%). The chemical category includes chlorides (25%), sulfates (22%), and other salts (22%), supported catalysts (22%), and oxide, sesquioxide and hydroxide (65%).

3/ Excludes wrought nickel.

4/ May include revisions for prior months.

5/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 5  
U.S. EXPORTS OF NICKEL, BY COUNTRY 1/

(Metric tons, nickel content 2/)

Period and country of destination	Cathodes, pellets, and briquets	Powder and flakes	Ferro- nickel	Metal- lurgical- grade oxide	Waste and scrap	Stainless steel scrap	Chemicals	Total 3/	Total year to date 4/	Wrought nickel
1995:										
April	101	66	--	292	965	3,250	136	4,810	16,500	14
May	43	110	24	361	1,100	2,430	236	4,300	20,900	62
June	364	145	--	335	1,070	2,150	373	4,440	25,300	26
July	135	138	98	260	893	1,660	160	3,340	28,600	21
August	226	118	76	340	1,540	3,400	186	5,890	34,500	42
September	46	69	77	240	1,090	2,240	185	3,950	38,500	39
October	44	239	3	297	1,830	2,410	289	5,110	43,600	51
November	38	72	235	196	1,270	2,370	117	4,300	47,900	18
December	21	74	294	471	827	1,800	164	3,650	51,500	147
January-December	1,310	1,230	807	3,500	14,200	27,600	2,920	51,500	XX	475
1996:										
January	7	69	429	262	714	1,570	158	3,210	3,210	22
February	72	53	60	78	903	1,430	305	2,900	6,110	23
March	80	92	181	271	859	1,140	261	2,880	8,990	52
April:										
Australia	--	(5/)	--	--	--	--	--	(5/)	22	--
Belgium	--	--	--	--	--	--	4	4	20	1
Canada	110	46	--	133	556	355	120	1,320	4,960	4
Germany	4	1	--	--	58	1	(5/)	64	242	(5/)
India	--	--	--	--	30	4	3	37	456	--
Italy	--	(5/)	--	--	--	2	(5/)	2	11	--
Japan	--	3	--	--	203	235	161	602	1,230	2
Korea, Republic of	--	1	--	--	--	682	9	692	1,740	1
Mexico	5	7	--	(5/)	3	2	8	25	113	11
Netherlands	--	--	--	--	--	1	--	1	108	--
Spain	--	--	--	--	--	879	--	879	1,610	--
Sweden	--	(5/)	--	--	102	304	--	406	1,140	1
Taiwan	--	--	119	--	2	147	7	275	946	(5/)
United Kingdom	--	1	--	--	8	11	14	34	102	6
Other	29	4	--	1	2	132	63	231	861	1
Total	148	63	119	134	965	2,760	389	4,570	13,600	27
1996: January-April	307	277	790	745	3,440	6,890	1,110	13,600	XX	125
1995: January-April	391	261	--	998	4,540	9,150	1,210	16,500	XX	68

XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ The nickel contents are assumed to be as follows: metallurgical-grade oxide (77%), waste and scrap (50%), and stainless steel scrap (7.5%). The chemical category includes chlorides (25%), sulfates (22%), and other salts (22%), supported catalysts (22%), and oxide, sesquioxide and hydroxide (65%).

3/ Excludes wrought nickel.

4/ May include revisions for prior months.

5/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 6  
U.S. IMPORTS FOR CONSUMPTION OF NICKEL ALLOYS, BY COUNTRY 1/

(Metric tons, gross weight )

Period and country of origin	Unwrought alloyed ingot	Bars, rods, and profiles	Wire	Plates and sheets	Foil	Tubes and pipes	Other alloyed articles	Total	Total year to date 2/
1995:									
April	290	75	176	85	(3/)	102	20	747	3,260
May	246	74	264	164	(3/)	70	35	853	4,110
June	200	133	178	78	(3/)	107	22	718	4,830
July	297	121	170	155	(3/)	141	40	925	5,750
August	288	158	127	175	(3/)	162	34	945	6,700
September	113	66	109	90	(3/)	86	23	488	7,190
October	340	46	89	107	(3/)	93	44	717	7,900
November	179	61	169	112	(3/)	39	43	603	8,510
December	79	183	158	130	3	49	29	632	9,140
January-December	3,000	1,180	2,030	1,510	3	1,040	378	9,140	XX
1996:									
January	114	212	154	116	(3/)	98	--	695	695
February	259	152	75	92	(3/)	65	--	643	1,340
March	300	176	151	123	(3/)	107	--	858	2,200
April:									
Australia	176	--	--	--	--	--	--	176	428
Belgium	13	--	--	(3/)	--	--	--	13	55
Brazil	--	--	--	--	--	--	--	--	10
Canada	32	(3/)	4	1	--	6	--	44	140
France	--	92	60	22	--	2	--	175	464
Germany	4	46	49	92	(3/)	27	--	219	814
Italy	--	20	--	--	--	(3/)	--	20	184
Japan	--	--	4	3	(3/)	4	--	10	80
Mexico	--	--	--	--	--	2	--	2	57
Netherlands	--	--	(3/)	--	--	32	--	33	34
South Africa	336	--	--	--	--	--	--	336	479
Sweden	--	--	37	14	--	15	--	67	228
United Kingdom	(3/)	22	4	(3/)	(3/)	6	--	31	233
Other	--	--	(3/)	--	--	(3/)	--	(3/)	116
Total	561	180	158	132	(3/)	95	--	1,130	3,320
1996: January-April	1,240	721	537	463	1	365	--	3,320	XX
1995: January-April	1,260	341	761	497	(3/)	295	107	3,260	XX

XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ May include revisions for prior months.

3/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 7  
U.S. EXPORTS OF NICKEL ALLOYS, BY COUNTRY 1/

(Metric tons, gross weight )

Period and country of destination	Unwrought alloyed ingot	Bars, rods, and profiles	Wire	Plates and sheets	Foil	Tubes and pipes	Other alloyed articles	Total	Total year to date 2/
1995:									
April	371	289	159	572	7	88	82	1,570	6,070
May	476	222	106	439	13	141	200	1,600	7,660
June	438	180	84	438	13	168	158	1,480	9,140
July	282	277	144	470	16	118	167	1,470	10,600
August	276	162	104	765	11	110	169	1,600	12,200
September	202	169	173	435	20	98	135	1,230	13,400
October	295	251	105	456	17	65	248	1,440	14,900
November	325	244	124	696	8	63	472	1,930	16,800
December	456	390	173	754	8	117	146	2,040	18,900
January-December	4,170	3,410	1,510	6,230	153	1,240	2,150	18,900	XX
1996:									
January	447	268	59	685	6	118	--	1,580	1,580
February	529	330	70	613	15	205	--	1,760	3,350
March	331	308	121	631	20	100	--	1,510	4,860
April:									
Australia	(3/)	--	2	17	--	(3/)	--	19	402
Belgium	--	(3/)	--	(3/)	--	2	--	3	118
Canada	212	22	34	54	5	35	--	362	1,270
France	232	101	(3/)	7	1	--	--	341	1,090
Germany	--	36	1	14	--	(3/)	--	51	224
India	(3/)	(3/)	--	(3/)	--	--	--	1	42
Ireland	--	--	29	3	--	--	--	32	54
Italy	--	12	2	113	(3/)	2	--	129	386
Japan	145	4	8	49	--	7	--	213	746
Korea, Republic of	1	1	(3/)	3	34	4	--	43	88
Mexico	11	1	18	12	--	13	--	55	133
Netherlands	13	6	--	5	--	(3/)	--	24	99
Singapore	--	5	17	(3/)	--	3	--	25	38
Spain	--	2	--	--	--	(3/)	--	2	12
Sweden	--	2	1	6	1	--	--	10	54
Switzerland	3	7	--	--	--	3	--	13	101
Taiwan	(3/)	(3/)	2	12	(3/)	--	--	14	22
United Kingdom	15	83	9	126	(3/)	4	--	237	1,080
Other	19	55	15	20	2	76	--	187	667
Total	651	337	138	441	43	149	--	1,760	6,620
1996: January-April	1,960	1,240	388	2,370	84	572	--	6,620	XX
1995: January-April	1,420	1,510	496	1,780	46	364	453	6,070	XX

XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ May include revisions for prior months.

3/ Less than 1/2 unit.

Source: Bureau of the Census.



TABLE 8  
NICKEL CONSUMPTION IN CAST AND WROUGHT PRODUCTS

	Percent	
	Wrought	Cast
May 1996:		
Stainless and heat resisting steels	100	(1/)
Alloy steels	95	5
Superalloys	80	20
Copper-nickel alloys	94	6
Other nickel-base alloys	100	(1/)

1/ Less than 1/2 unit.

TABLE 9  
NICKEL PRICES

Date	Cathode NY Dealer \$/lb.	LME Cash \$/t	LME Cash \$/lb.	18/8 Stainless steel scrap Pittsburgh \$/long ton(gw)
Average for month of:				
1996:				
April	3.783	8,042.850	3.648	913
May	3.725	8,026.548	3.641	862
June	3.585	7,709.475	3.497	853
For week ending:				
1996:				
April 5	3.82-3.87	8,035.000	3.645	900-925
April 12	3.76-3.85	8,075.625	3.663	900-925
April 19	3.80-3.87	8,083.000	3.666	900-925
April 26	3.76-3.83	8,009.200	3.633	900-925
May 3	3.71-3.81	7,988.700	3.624	850-875
May 10	3.81-3.95	8,322.500	3.775	850-875
May 17	3.79-3.93	8,121.300	3.684	850-875
May 24	3.65-3.78	7,817.100	3.546	850-875
May 31	3.64-3.73	7,896.375	3.582	850-875
June 7	3.66-3.73	7,834.500	3.554	840-865
June 14	3.62-3.65	7,793.000	3.535	840-865
June 21	3.59-3.64	7,676.400	3.482	840-865
June 28	3.47-3.56	7,534.000	3.417	840-865

Sources: Platt's Metals Week and American Metal Market.